# Precision and Accuracy of Axygen® 1000 µL Automation Pipet Tips for Hamilton® Microlab® Prep™, STAR™ Line, NIMBUS®, and VANTAGE® Liquid Handling Workstations

## Application Note

*Srividya Dadi, Audrey Bergeron, and Hannah Gitschier*
*Corning Incorporated, Life Sciences*
*Kennebunk, ME USA*

## Introduction

Automated liquid handling and high throughput screening (HTS) are widely used for drug discovery, molecular biology applications, and genomics. For HTS, reliable sample preparation and delivery methods have become critical to assay performance. Corning introduced a line of 1000 µL Axygen pipet tips, which have been specifically designed for applications using the Hamilton Microlab Prep, STAR Line, NIMBUS, and VANTAGE liquid handling workstations. The precision and accuracy testing was performed using the Microlab STAR; however, the other lines of liquid handlers also use the same pipetting system, and, therefore, the tips are compatible with all lines.

The focus of this study was to evaluate the quality, dispensing volume accuracy, and precision of the Axygen 1000 µL tips on the Hamilton Microlab STAR automation platform as compared to Hamilton 1000 µL tips. These criteria were measured using the Artel Multichannel Verification System (MVS®). The results demonstrate that Axygen 1000 µL tips are comparable to Hamilton 1000 µL tips using the Hamilton Microlab STAR liquid handling workstation to dispense volumes as low as 50 µL and as high as 1000 µL.

## Materials and Methods

The Hamilton Microlab STAR liquid handling workstation (Hamilton Cat. No. 1532) was used to assess accuracy as percent deviation (% D) and precision as coefficient of variation (% CV), for Axygen 1000 µL tips (Corning Cat. No. HT-1000-CBK-HTR) and Hamilton 1000 µL tips.

To test the ability of each brand of tips to accurately and precisely dispense 50 µL, a column of 8 tips was arranged so that each tip aspirated 50 µL of Range A solution (Artel Cat. No. MVS-203) from an Axygen Low Profile reservoir (Corning Cat. No. RES-SW96-LP) and each tip dispensed 50 µL into 1 column of a Corning® 96-well black/clear-bottom microplate (Corning Cat. No. 3631) containing 150 µL of diluent solution (Artel Cat. No. MVS-202) in each well. To determine the volume of liquid dispensed into each well, absorbance readings for the diluted Range A solution were measured using an Artel ELx800NB® Plate Reader (Artel Cat. No. 1311197). Studies were performed 6 independent times, for each brand of tips. Evaluation criteria include standard deviation, % D, and the % CV of the 6 replicates.

To test the ability of each brand of tips to accurately and precisely dispense 1000 µL, a column of 8 tips was arranged so that each tip aspirated 1000 µL of Range HV solution (Artel Cat. No. MVS-214) from an Axygen Low Profile reservoir and each tip dispensed 250 µL into 4 columns of a Corning 96-well black/clear -bottom microplate. To determine the volume of liquid dispensed into each well, absorbance readings for the Range HV solution were measured using an Artel ELx800NB Plate Reader. Studies were performed 3 independent times for each brand of tips. Evaluation criteria include standard deviation, % D, and the % CV of the 3 replicates.

## Results and Discussion

The evaluation criteria for comparing Axygen 1000 µL tips with Hamilton 1000 µL tips are listed in Tables 1 and 2. The ability of the pipet tips to dispense 50 µL and 1000 µL volumes accurately and precisely was determined through the analysis of the mean volume dispensed from 8 tips for each brand across 6 replicates for 50 µL dispense, and across 3 replicates for 1000 µL dispense. The precision of each brand of tip is represented by the % CV of the replicates. Similarly, the accuracy is represented by the % D from the target volume of the replicates.

**Table 1.** Evaluation Criteria for 50 µL Dispense Volume

| 50 µL | Axygen | Hamilton |
|---|---|---|
| n | 6 | 6 |
| Target Volume (µL) | 50.00 | 50.00 |
| % CV | 0.84% ± 0.23% | 0.65% ± 0.09% |
| % D | 9.44% ± 0.48% | 9.52% ± 0.30% |
| Total No. of Outliers | 0 | 0 |

**Table 2.** Evaluation Criteria for 1000 µL Dispense Volume

| 1000 µL | Axygen | Hamilton |
|---|---|---|
| n | 3 | 3 |
| Target Volume (µL) | 1000.00 | 1000.00 |
| % CV | 0.38% ± 0.12% | 0.37% ± 0.13% |
| % D | 1.51% ± 0.30% | 1.16% ± 0.28% |
| Total No. of Outliers | 0 | 0 |

Data in tables shows ± standard deviation. Hamilton®, Microlab®, NIMBUS®, and VANTAGE® are registered trademarks of Hamilton Company. CO-RE™, Prep™, STAR™, STARlet™, and STARplus™ are trademarks of Hamilton Company. The compatibility of Axygen tip products with Hamilton Company products has been independently determined by Corning; however, there should be no implication of sponsorship or endorsement by Hamilton Company of Axygen tip products.

It is important to note that the accuracy of liquid dispense may vary depending on the method and liquid class selection chosen when using the liquid handling platform. However, for these studies the method and liquid used for testing was identical for Axygen® 1000 µL tips and Hamilton 1000 µL tips.

As demonstrated in Figure 1, Axygen 1000 µL tips displayed comparable precision to Hamilton 1000 µL tips using the Hamilton Microlab® STAR automation system. There was no significant difference in the precision of each brand of tips when dispensing 50 µL (Figure 1A) or 1000 µL (Figure 1B).

As demonstrated in Figure 2, Axygen 1000 µL tips displayed comparable accuracy to the Hamilton 1000 µL tips using the Hamilton Microlab STAR automation system. There was no significant difference in the accuracy of each brand of tips when dispensing 50 µL (Figure 2A) or 1000 µL (Figure 2B).

## Conclusions

Axygen 1000 µL tips demonstrate precision and accuracy comparable to Hamilton 1000 µL tips using the Hamilton Microlab STAR Liquid Handling Workstation to dispense volumes as low as 50 µL and as high as 1000 µL.

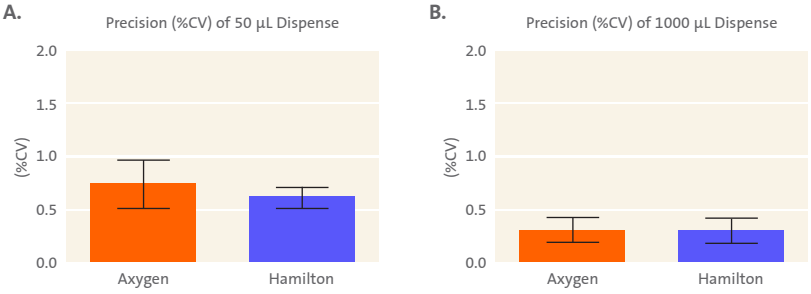


**Figure 1. Precision (% CV) Analysis of 1000 µL Tips.** The % CV of Axygen and Hamilton 1000 µL tips dispensing (A) 50 µL and (B) 1000 µL volume using the Hamilton Microlab STAR liquid handling workstation was determined using the Artel MVS® System. There was no significant difference in the % CV between each brand. Data shown with standard deviation (SD). n = 6 for 50 µL dispense. n = 3 for 1000 µL dispense.

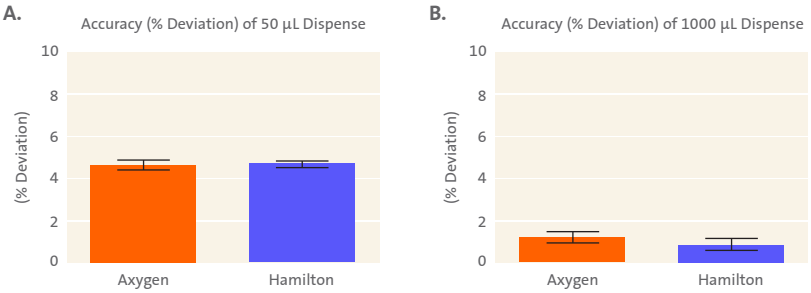


**Figure 2. Accuracy (% D) Analysis of 1000 µL Tips.** The % D of Axygen and Hamilton 1000 µL tips dispensing (A) 50 µL and (B) 1000 µL volume using the Hamilton Microlab STAR liquid handling workstation was determined using the Artel MVS System. There was no significant difference in the % D between each brand. Data shown with SD. n = 6 for 50 µL dispense. n = 3 for 1000 µL dispense.

For more specific information on claims, visit www.corning.com/certificates.

**Warranty/Disclaimer:** Unless otherwise specified, all products are for research use or general laboratory use only. Not intended for use in diagnostic or therapeutic procedures. These products are not intended to mitigate the presence of microorganisms on surfaces or in the environment, where such organisms can be deleterious to humans or the environment. Corning Life Sciences makes no claims regarding the performance of these products for clinical or diagnostic applications.


CORNING

**Corning Incorporated**
*Life Sciences*

**www.corning.com/lifesciences**

**NORTH AMERICA**
t 800.492.1110
t 978.442.2200

**ASIA/PACIFIC**
**Australia/New Zealand**
t 61 427286832
**Chinese Mainland**
t 86 21 3338 4338
**India**
t 91 124 4604000
**Japan**
t 81 3-3586 1996
**Korea**
t 82 2-796-9500
**Singapore**
t 65 6572-9740
**Taiwan**
t 886 2-2716-0338

**EUROPE**
CSEurope@corning.com
**France**
t 0800 916 882
**Germany**
t 0800 101 1153
**The Netherlands**
t 020 655 79 28
**United Kingdom**
t 0800 376 8660
**All Other European Countries**
t +31 (0) 206 59 60 51

**LATIN AMERICA**
grupoLA@corning.com
**Brazil**
t 55 (11) 3089-7400
**Mexico**
t (52-81) 8158-8400



Hamilton®, Microlab®, NIMBUS®, and VANTAGE® are registered trademarks of Hamilton Company. CO-RE™, Prep™, STAR™, STARlet™, and STARplus™ are trademarks of Hamilton Company. The compatibility of Axygen tip products with Hamilton Company products has been independently determined by Corning; however, there should be no implication of sponsorship or endorsement by Hamilton Company of Axygen tip products.

For a listing of trademarks, visit www.corning.com/clstrademarks. All other trademarks are the property of their respective owners.
© 2014, 2021 Corning Incorporated. All rights reserved. 5/21 CLS-A-AN-306 REV2